NOAA CLIMATE AND GLOBAL CHANGE
AND CLIMATE OBSERVATIONS AND SERVICES:

GLOBAL CARBON CYCLE PROGRAM (GCC)

FY2002 Information Sheet

IMPORTANT DATES:
Letters of intent : Due by E-mail or fax by February 15, 2002
Full proposals: Due by April 8th, 2002 (except repeat hydrography proposals, see below)
Start Dates: September 1, 2002

Information on proposal submission procedures, contact information, etc. can be found in the 2002 Climate and Global Change announcement [http://www.ogp.noaa.gov/c&gc/ao/2002/fy2002.htm] and amendment [http://www.ogp.noaa.gov/c&gc/ao/2002/01_14_-2amend.htm].

Background

Global Carbon Cycle (GCC): The U.S. Interagency Carbon Cycle Science Program (CCSP) seeks to answer two overarching questions:

1) How large and variable are the dynamic reservoirs and fluxes of carbon within the Earth system, and how might carbon cycling change and be changed in future years, decades and centuries?, and
2) What are our options for managing carbon sources and sinks to achieve an appropriate balance of risk, costs, and benefits to society?

For more detailed information on interagency priorities, science planning and agency roles, please consult the internet at: http://www.carboncyclescience.gov

NOAA's participation in the U.S. program focuses on three main goals:

1) Quantifying spatial patterns and variability of carbon sources and sinks at global to regional scales;
2) Documenting the fate of anthropogenic CO_2 in the atmosphere and oceans; and
3) Improving future climate predictions by incorporating a dynamic understanding of the carbon cycle into models.

To achieve these goals, the NOAA GCC program focuses on oceanic and atmospheric observations, large-scale process-oriented field studies and modeling. Information and current project abstracts can be found on the internet at:
http://www.ogp.noaa.gov/mpe/gcc/index/html

FY2002 Summary:

For FY2002, GCC is soliciting projects in support of these goals in three overarching theme areas: A) Global Distribution and Dynamics of Carbon Sources and Sinks; B) Carbon budgets over North America and adjacent ocean basins; and C) Synthesis, Modeling, Interpretative studies, and Human Dimensions. These themes will be addressed by funds available through (1) the Climate Observations and Services Program, and (2) the Climate and Global Change Program. Accordingly, tasks are grouped by these two programs and sub-divided within each program into the overarching theme areas.

Theme areas:

A. Global Distribution and Dynamics of Carbon Sources and Sinks

A variety of atmospheric, oceanic and terrestrial data has shown that the ocean and the terrestrial biosphere currently take up and store a significant portion of the carbon released to the atmosphere as a result of human activities. Preliminary progress has been made on locating sources and sinks of carbon on a regional basis and characterizing their magnitude and behavior over time. The results obtained thus far are at the limit of detection, however, and cannot be extended to many regions of the world due to lack of data. In FY2002, GCC is seeking to augment the observational network in the ocean and atmosphere to fill in critical spatial and temporal gaps, as well as supporting research in network design, parameterization improvement, and data management. Further details on the strategy for augmenting the observational network can be obtained from the "Large-Scale Carbon Dioxide Observational Plan (LSCOP)", available on the web at:
http://www.ogp.noaa.gov/mpe/gcc/co2/observingplan/toc.htm

B. Carbon Budgets over North America and Adjacent Ocean Basins

One region of uncertainty in the global carbon cycle budget is North America and the adjacent ocean basins. Recent studies indicate that the region may be currently taking up carbon at a significant level, however data and models needed to monitor budgets at the required spatial and temporal resolution are insufficient. Research advances now offer the opportunity to resolve the regional pattern of and mechanisms responsible for carbon dioxide uptake. In FY2002, GCC is seeking to participate in a coordinated, interagency effort to conduct pilot observations, data assimilation, and network design in North America, and the North Atlantic and Pacific oceans. Further details on the North America Carbon Plan activity can be found on the web at:
http://www.carboncyclescience.gov/

C. Synthesis, Modeling, Interpretive Studies and Human Dimensions
In FY2002, GCC is seeking studies using empirical data and synthesized datasets, existing models, data assimilation techniques, and theory to advance the ability to quantify spatial patterns and variability of carbon sources and sinks at global to regional scales; document the fate of anthropogenic CO2 in the atmosphere and oceans; and/or improve future climate predictions by incorporating a dynamic understanding of the carbon cycle into models. Pilot studies examining the needs of decision-makers for carbon cycle information are also encouraged.

FY2002 Priorities

(1) CLIMATE OBSERVATIONS AND SERVICES PROGRAM (CO&S)

Two components of Climate Observations and Services are available to support carbon cycle-related research. One is the Carbon Cycle Science component, which is discussed in I below, and the second is the Ocean Observations component, which is discussed in II below.

Goal: One goal of the carbon cycle science component of NOAA's Climate Observations and Services program is to build the next generation observing system capable of resolving carbon sources and sinks at a regional scale, documenting the fate of anthropogenic CO_2 in the oceans and atmosphere, and providing the observational underpinning to aid predictions of future atmospheric CO_2 concentrations.

I. Atmospheric CO_2 and Surface Ocean pCO_2 Observations (CO&S: Carbon Cycle Science -- $2.3M potentially available for this component)

Strategy: Over the next five years, the Carbon Cycle Science component will perform the requisite pilot studies, field observations, sensor testing and design, data management, data interpretation, etc. to enable implementation of a sustained, cost-effective network to:

· Measure annual flux between temperate North America biosphere and the atmosphere to an accuracy of 0.2 GtC/year at scales relevant to the major mechanistic drivers of carbon sources and sinks
· Resolve atmosphere-land fluxes in other world regions to 0.5 GtC/year
· Measure air-sea fluxes for major ocean regions to 0.1-0.2 GtC/year on seasonal time scales

For more information, consult LSCOP [http://www.ogp.noaa.gov/mpe/gcc/co2/observingplan/toc.htm] chapters 2 and 3.

After approximately five years, proven elements that successfully meet the goals of Climate Observations and Services will be transitioned to long-term support to become part of the sustained, climate observing system.

Tasks for FY2002

Proposals are solicited in the following elements that have been identified as high priority to meet the above objectives (see the LSCOP report for a more detailed explanation):

Theme A: Global Distribution and Dynamics of Carbon Sources and Sinks

Augmentation of the Global Atmospheric Network over continental regions: In particular, new sites or continuing collaborations to augment CO_2 observations in South America, Africa, and the Siberian region as part of the sustained cooperative air sampling network are encouraged. Proposals that seek to improve quality control and measurement methodology across international atmospheric CO_2 programs are also encouraged. For a map of the existing sites in the NOAA-CMDL cooperative air sampling network see the internet at:
http://www.cmdl.noaa.gov/ccgg/figures/ccggmap.gif

*Atmospheric measurements on ships of opportunity***:** Atmospheric measurements from volunteer observing ships have been a routine part of the global atmospheric monitoring network as well as observational research programs. Proposals are encouraged to renew or establish new track locations for atmospheric CO_2 or O_2/N_2 in priority areas such as the North Atlantic, Southern Ocean and the North Pacific.

Continue existing pCO_2 lines on ships of opportunity and moorings: For the past several years, oceanic pCO_2 has been measured on ships of opportunity in the Southern Ocean and ships and moorings in the Equatorial Pacific through the NOAA research program. Proposals are encouraged to continue observations supported by NOAA in regions of high variability, such as the Equatorial Pacific, or high uncertainty, such as the Southern Ocean.

Data Management System for ocean surface pCO_2: Proposals for pilot data management and access systems for pCO_2 observations from ships of opportunity and moorings are encouraged. For background, applicants should consult the conclusions of a data management workshop available on the web [http://www.ogp.noaa.gov/mpe/gcc/pdf/noaadatamangeplan.pdf].

Theme B: Carbon Budgets over North America and Adjacent Ocean Basins

Research in this topic area relevant to NOAA's GCC strategy is encouraged to prepare for the proposed North American Carbon Program (NACP: www.carboncyclescience.gov). NOAA will evaluate proposals received to conduct NACP preparatory research in consultation with the U.S. Global Change Research Program (USGCRP)'s Carbon Cycle Interagency Working Group (CCIWG; www.carboncyclescience.gov) and pursuant to NOAA's established Climate and Global Change procedures.

Vertical Profiles over North America: Proposals are encouraged to begin vertical atmospheric CO_2 sampling at new sites in North America, including a site in the New England region. The number of sites to be funded will depend on costs, however NOAA hopes to establish at least 5 new sites. These pilot sites should be selected to experimentally determine where long-term sites should be located, how many should be established, what should be measured, and at what frequency in order to best constrain the regional patterns of sources and sinks over North America. Use of continuous sampling devices is encouraged. As this element will be implemented in concert with other coordinated North American carbon activities, full, timely release of data for use by the community and network design projects is required of successful applicants.

Instrument additional ships of opportunity with pCO_2 sensors: Proposals are encouraged to instrument cross-basin volunteer observing ships with automated underway pCO_2 sensors. NOAA hopes to establish at least four new tracks, although the number of tracks supported will depend on cost. The first priority for location of new tracks is the North Atlantic, although proposals for the North Pacific will also be considered. Highest priority will be given to currently undersampled regions, which include areas of high ΔpCO_2 and high wind speeds. Other criteria for evaluating potential tracks include: stability of route, available scientific infrastructure, access for maintenance, and potential for international coordination. For information on existing international pCO_2 track lines, see http://www.ioc.unesco.org/iocweb/CO2panel/vosinventory.htm.

II. Ocean Interior Observations (CO&S: Ocean Observations – To be considered jointly for funding with NSF; NOAA's potential contribution is $0.8M for this component)

Strategy:
For the past decade, high quality CO_2 system and supporting measurements of the ocean interior have been made through international research programs. NOAA is now transitioning this activity to become a component of the sustained global climate observing system. Because of the synergy with goals of the CLIVAR program, observations will be funded and carried out in concert with CLIVAR. The ocean interior component of the global climate observing system will provide the observational constraints to:

· determine the large-scale decadal evolution of the anthropogenic CO_2 inventory to within 10% (~3 Pg C globally over the next decade) on a global and basin scale
· close the decadal basin-scale budget of carbon to within 0.1 Pg C/year on the basis of inventory changes and air-sea flux
· determine the response of the oceanic carbon system to interannual and interdecadal climate variability
· provide decadal time-scale changes in the distribution of CO_2 species, transient tracers and other biogeochemical tracers to constrain models to improve their predictability

For more information, consult LSCOP [http://www.ogp.noaa.gov/mpe/gcc/co2/observingplan/toc.htm] chapter 4.

Tasks for FY2002

Theme A: Global Distribution and Dynamics of Carbon Sources and Sinks

Initiate repeat ocean sections. Proposals to commence an ongoing program to sample the global ocean through 15 repeat sections every ten years are encouraged. Properties to be measured might include hydrography, redundant CO_2 system properties, nutrients, halocarbons, and emerging tracers. For more information on community planning to define measurement priorities, sequence of sections, and data management, please see the Internet at: http://www.aoml.noaa.gov/ocd/repeathydro/index.html. Initial priorities for the first five years are to conduct meridional and zonal section sampling in the Atlantic and the Pacific.

Principal Investigators—please note: Proposals for the repeat ocean section component will be reviewed jointly by NSF and NOAA in support of CLIVAR and Carbon Cycle programs. Proposals should be submitted directly to NSF under Program Announcement NSF 02-016 via Fastlane no later than March 5, 2002. Three paper copies should also be sent to NOAA/OGP by the same date. Proposals should be written for a five year performance period.

Climate Observations and Services Proposal Requirements:

In addition to the necessary elements of a proposal outlined in the Climate and Global Change Program announcement [http://www.ogp.noaa.gov/c&gc/ao/2002/fy2002.htm], proposals written to respond to this Climate Observations and Services component should contain the following information:

Project vision: Individual projects should be justified by their overall contribution toward building a sustained, coordinated observing system and producing carbon cycle science products of relevance to society.

Project coordination: Principal investigators funded under Carbon Cycle Science CO&S tasks will be required to participate in a Science Team to ensure that individual projects are coordinated, comparable, and optimized to help design the sustained observing system and support product delivery. P.I.s should budget costs for attending one team meeting per year into their proposals.

Data policy: Data collection should be viewed as a contribution to a community network of climate observations, not solely as supporting individual investigator inquiry. Therefore, data obtained with funding from Climate Observations and

Services are to be made available to the public in a timely manner. The length of time between collection and publication on the internet or other means of dissemination will likely vary depending on the type of data being collected. Principal investigators will be expected to release their data on a regular basis, from one month to several months after collection, depending on the data type. Preliminary discussions of data policy requirements have taken place in a community workshop and the results can be found on the internet [http://www.ogp.noaa.gov/mpe/gcc/pdf/noaadatamangeplan.pdf]. Final data policy will be established in 2002 through negotiations with principal investigators and the program manager.

Length of project: Three years, with the possibility of renewal, with the exception of Ocean Interior observations which will be funded as sustained components with five year performance periods.

(2) CLIMATE AND GLOBAL CHANGE PROGRAM (C&GC: $2M potentially available for this component)

Strategy: In FY2002, the Global Carbon Cycle (GCC) program is encouraging research proposals to conduct synthesis, modeling, interpretative studies and human dimensions activities to complement the observational activities described above.

Tasks for FY2002

Theme C: Synthesis, Modeling, Interpretive Studies and Human Dimensions:

Synthesis, Modeling and Interpretive Studies: In FY2002, GCC (C&GC) is seeking studies using empirical data and synthesized datasets, existing models, data assimilation techniques, and theory to advance the ability to quantify spatial patterns and variability of carbon sources and sinks at global to regional scales; document the fate of anthropogenic CO_2 in the atmosphere and oceans; and/or improve future climate predictions by incorporating a dynamic understanding of the carbon cycle into models. Areas of focus could include, but are not limited to: Methods for constraining ocean-atmosphere or land-atmosphere carbon fluxes at regional scales; Atmospheric transport model improvement; Ocean circulation model improvement; Gas exchange parameterization development; Pilot oceanic or atmospheric CO_2 data assimilation efforts; Large-scale carbon cycle network design studies (ocean and atmosphere); and Investigations into the causes of observed variability in interannual atmospheric CO_2 growth rate. Carbon cycle research to prepare for the proposed North American Carbon Program (NACP) is encouraged. NOAA will evaluate proposals received to conduct NACP preparatory research in consultation with the U.S. Global Change Research Program (USGCRP)'s Carbon Cycle Interagency Working Group (CCIWG; www.carboncyclescience.gov) and pursuant to NOAA's established Climate and Global Change procedures. Proposals may be written for up to three years of funding, at approximately $150K per year. Principal investigators

who wish to work on NACP preparatory work or network design may be asked to join a Science Team as described above in the observations section.

Human Dimensions: Proposals are encouraged to conduct a rigorous survey grounded in social science methodology to identify synergies and gaps between the science outlined in the Carbon Cycle Science Plan and the needs of U.S.-based decision-makers. Successful proposals must be led by a team consisting of an expert in social science survey methodology and an expert in the biophysical aspects of the carbon cycle. Priority will be given to projects that identify the synergies and gaps between decision-maker needs and scientific plans for the following subset of topics discussed in the Carbon Cycle Science Plan: 1) Quantifying spatial patterns and variability of carbon sources and sinks at global to regional scales over North America; 2) Documenting the fate of anthropogenic CO_2 in the atmosphere and oceans; and 3) Improving future climate predictions by incorporating a dynamic understanding of the carbon cycle into models. One or two projects may be funded. One- or two-year proposals are encouraged at a funding level up to $150K per year per project.